



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/518,560

08/31/2005

Albane Audemer

UMC.10018

6787

45473 7590 04/15/2008  
HUTCHISON LAW GROUP PLLC  
PO BOX 31686  
RALEIGH, NC 27612

EXAMINER

SIDDIQUEE, MUHAMMAD S

ART UNIT

PAPER NUMBER

1795

MAIL DATE

DELIVERY MODE

04/15/2008

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/518,560	<b>Applicant(s)</b> AUDEMER ET AL.	
	<b>Examiner</b> MUHAMMAD SIDDIQUEE	<b>Art Unit</b> 4151	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 20 December 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 December 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>8/31/2005</u> .   | 6) <input type="checkbox"/> Other: _____                          |

## DETAILED ACTION

### *Claim Objections*

1. Claim 1 is objected to because of the following informalities: Acronyms are used without first being defined. Appropriate correction is required.

### *Claim Rejections - 35 USC § 102*

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this

Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1, 4, 7 and 12 are rejected under 35 U.S.C. 102(b) as being anticipated by Huang Et al (“Approaching theoretical capacity of LiFePO<sub>4</sub> at room temperature at high rates”; Electrochemical and solid-state letters, vol. 4, no. 10, October 2001).

Regarding claim 1, Huang teaches a method of preparing carbon coated LiFePO<sub>4</sub> comprising preparing a water-based solution comprising, as solutes Li-containing olivine precursor compound (CH<sub>3</sub>COOLi) and carbon-bearing monomer compound (CH<sub>3</sub>COO)<sub>2</sub>Fe; precipitating the Li-containing olivine precursor compound and polymerizing the monomer compound in a single step; heat treating the obtained precipitate in an inert (neutral) environment so as to

Art Unit: 1795

form a Li-containing olivine crystalline phase and decompose the polymer to carbon [page A170, paragraph 3; page A171, paragraph 1-2].

Regarding claim 4, Huang teaches that precipitation of Li-containing olivine compounds and the polymerization of the monomers is performed by evaporating water from the water-based solution [page A170, paragraph 3; page A171, paragraph 1-2].

Regarding claims 7 and 12, Huang teaches the water-based solution contains Li, Fe and phosphate. The evaporation of water from the solution is performed at a temperature of 80 °C. The heat-treatment is performed at 700 °C [page A171, paragraph 1-2].

### ***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.

Art Unit: 1795

3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claims 2-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Huang Et al ("Approaching theoretical capacity of LiFePO<sub>4</sub> at room temperature at high rates"; Electrochemical and solid-state letters, vol. 4, no. 10, October 2001) as applied in claim 1 and further in view of Armand et al (WO 0227823)

Regarding claim 2 and 3, Huang does not explicitly disclose a generalized formula for the crystalline phase. However, Armand teaches synthesis of carbon coated redox materials where the material is generalized as  $C-Li_xM_{1-y}M'_y(XO_4)_n$  where  $0 \leq x \leq 2$  and  $0 \leq y \leq 0.6$  and  $1 \leq n \leq 1.5$ , M is a transitional metal or mixture of transitional metals (Ti V Cr Mn Fe Co Ni Sc Nb) and M' is an element from fixed valency, X is selected from S, P and Si [Abstract; page 8, lines 1-26]. So with  $y=0$ ,  $x=1$ ,  $n=1$  and  $X=P$ , the generalized formula for crystalline phase

Art Unit: 1795

translates to  $\text{LiM}(\text{PO}_4)$  and  $\text{M}=\text{Fe}$  gives  $\text{LiFe}(\text{PO}_4)$ . Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to recognize that  $\text{LiFe}(\text{PO}_4)$  could have been generalized as taught by Armand in order to show how other materials fall into the same category.

8. Claims 5-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Huang Et al ("Approaching theoretical capacity of  $\text{LiFePO}_4$  at room temperature at high rates"; Electrochemical and solid-state letters, vol. 4, no. 10, October 2001) as applied in claim 1 and further in view of Pechini (US 3,330,697) and Tietz et al (WO 02/44103 A1).

Regarding claim 5-6, Huang does not teach about using ethylene glycol and citric acid as carbon bearing monomer compound. Molecular-scale mixing is required when preparing compounds containing more than one metal to avoid formation of mixture of crystals of varying sizes and compositions and helps drastic reduction in calcination temperature [column 2, lines 50-61; column 3, lines 3-4 of '697]. Pechini teaches using ethylene glycol and citric acid for dissolving metal in a molecular-scale mixing [column 3, lines 33-36 of '697]. Ethylene glycol is a polyhydroxy alcohol (polyhydric alcohol) and has a property of highly solubility in water. Tietz teaches using citric acid as a metal complex former which acts as a chelating agent [page 2, lines 19-27; page 4, lines 6-15 of '103]. Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to use ethylene glycol and citric acid as carbon bearing monomer compound as taught by Pechini/Tietz in the process of

Art Unit: 1795

Huang in order to have high water solubility and easily form metal complex and which can be sintered at lower temperature.

9. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Huang Et al ("Approaching theoretical capacity of LiFePO<sub>4</sub> at room temperature at high rates"; Electrochemical and solid-state letters, vol. 4, no. 10, October 2001) as applied in claim 7 and further in view of Wurm et al (WO 02/099913 A1).

Regarding claim 8, Huang fails to teach that the water-based solution is prepared using LiH<sub>2</sub>PO<sub>4</sub> and Fe(NO<sub>3</sub>)<sub>3</sub>.aq. However, Wurm teaches a method of preparing LiFePO<sub>4</sub> where the water-based solution is prepared using LiH<sub>2</sub>PO<sub>4</sub> and Fe(NO<sub>3</sub>)<sub>3</sub>.aq.[page 5, lines 26-28]. Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to use LiH<sub>2</sub>PO<sub>4</sub> and Fe(NO<sub>3</sub>)<sub>3</sub>.aq to prepare a water-based solution as taught by Wurm in the process of Huang in order to have a very high homogeneous precursor mixture containing Li, Fe and P.

10. Claims 9-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Huang Et al ("Approaching theoretical capacity of LiFePO<sub>4</sub> at room temperature at high rates"; Electrochemical and solid-state letters, vol. 4, no. 10, October 2001) in view of Ravet et al (US 2002/0195591 A1).

Regarding claim 9-11, Huang teaches an electrochemical cell (battery) comprising a cathode (electrode) containing carbon-coated LiFePO<sub>4</sub> powder for use in Li insertion-type electrodes having an active component in a cathode cycled between 2.0 and 4.0 V against a Li anode at a discharge rate of C / 5 at

Art Unit: 1795

25 °C, is characterized by a reversible electrode capacity expressed as 99 % capacity of the theoretical capacity and a total carbon content of 20 wt.% carbon [Fig. 2, 3; page A171, 172]. Huang fails to disclose that carbon content is less than 4 wt.%. However, Ravet teaches carbon-coated  $\text{LiFePO}_4$  electrode material for battery with less than 4 wt.% having over 75 % capacity of the theoretical capacity [Examples 1, 2, 3]. Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made utilize lesser quantity of carbon in the electrode and would still get higher percent of the theoretical capacity.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MUHAMMAD SIDDIQUEE whose telephone number is (571)270-3719. The examiner can normally be reached on Monday-Thursday, 7:30 am to 4:00 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.



Art Unit: 1795

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free)? If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

MSS

/PATRICK RYAN/  
Supervisory Patent Examiner, Art Unit 1795